

FLORISTICS OF TWO LOUISIANA SANDSTONE GLADES

B.R. MacRoberts & M.H. MacRoberts

Bog Research, 740 Columbia, Shreveport, Louisiana 71104 U.S.A.

ABSTRACT

The floristics and edaphic conditions of two west Louisiana sandstone glades are described.

KEY WORDS: Sandstone glade, Kisatchie National Forest, floristics, Louisiana

INTRODUCTION

In a previous paper we have described the floristics, species richness, geology, and edaphic conditions of one sandstone glade (Flat Glade) in the Kisatchie Ranger District of the Kisatchie National Forest in western Louisiana (MacRoberts & MacRoberts 1992). Since each glade is unique, we wished to study several to get an overall sample of the range of variation in plant species found in them. For this study we chose two glades in the Kisatchie Ranger District that, because of previous surveys, we had reason to believe bracketed Flat Glade. One had less ground cover, the other had more. One had more exposed rock, the other had less. We describe here their floristics and edaphic conditions.

Increased familiarity with the literature on the floristics of sandstone glades in the eastern United States has reinforced our initial impression that while there is substantial information on this habitat for the east central United States, there are few descriptions of glade communities in the West Gulf Coastal Plain (see DeSelm 1986; Perkins 1981; Baskin & Baskin 1989, and references therein).

STUDY SITES AND METHODS

Turpentine Glade is located about 18 km SW of Cloutierville, Louisiana, in T6N R7W S34; X Glade is about 18 km WSW of Cloutierville in T6N R7W S17. They are about 5 km apart and about 7.5 km SW and W of Flat Glade, respectively. They are approximately 80 meters above sea level and each measures about 1.2 ha. Neither has been burned for several years, and although their specific fire histories are unknown, since they are embedded in the pyrogenic longleaf pine community they undoubtedly burned regularly in the past (Smith 1991; Martin & Smith 1991). Both occur on Catahoula sandstone embedded in Kisatchie clay (Martin *et al.* 1990; MacRoberts & MacRoberts 1992).

X Glade is severely eroded in places, with little or no soil on exposed rock or in washed out gullies. Over most of its surface, vegetative ground cover is discontinuous. Turpentine Glade is characterized by a continuous herbaceous cover with little recent erosion and only small areas of exposed ground or rock surface. Neither site has extensive "flat-rock" or sandstone "pavements," which characterize some glades in the Kisatchie National Forest and in other parts of the southeast and east (Perkins 1981).

Climatic data are given in Martin *et al.* (1990) and MacRoberts & MacRoberts (1992). Annual precipitation averages about 125 cm. The year of the study, 1992, was cooler than average, with summer temperatures seldom rising above 35 ° C.

We visited both glades every two weeks between March and November 1992 to identify all vascular plant species occurring at each site. At both, the entire glade was surveyed. Although both sites were rich in lichens (e.g., *Cladonia* spp.) and mosses, we did not attempt to identify these. We follow MacRoberts (1989) and Gandhi & Thomas (1989) for botanical nomenclature.

We ran a transect 137 meters long and 3 meters wide through the longest part of each glade. Within the transect we counted the number of trees over 1.5 m tall and measured their dbh. Soil samples were taken as in our previous study and analyzed by A & L Analytical Laboratories, Memphis, Tennessee.

We cursorily explored other sandstone glades (and similar open habitat) in the Kisatchie National Forest, and in the Angelina National Forest, Texas, about 120 km southwest of our study sites in Louisiana.

RESULTS

X Glade is a mesa-like outcrop rising in a single tier of about 7 meters above the surrounding upland longleaf pine forest. Turpentine Glade consists of a small butte about 7 meters high surrounded by a talus slope. The transition between glade and surrounding longleaf pine forest is not abrupt at either site.

Table 1. Soil characteristics.

Sample	pH	Exchangeable ions (ppm)				
		P	K	Ca	Mg	OM%
X Glade	4.6	6	53	480	248	1.6
Turp. Glade	5.1	5	20	270	53	1.5

Both glades are open with widely scattered stunted and gnarled trees. At Turpentine Glade there were eight *Pinus palustris* P. Mill. in the 411 square meter transect ranging from 3 to 32 cm dbh, with a mean of 10.9 cm. This translates to one tree per 51 square meters and a canopy cover of about 10%. X Glade had more trees; in the 411 square meter transect there were 19 (1 *Quercus marilandica* Muenchh., 3 *Pinus echinata* P. Mill., 5 *P. taeda* L., and 10 *P. palustris*), ranging from 3 to 30 cm dbh, with a mean of 9.6 cm. This translates to one tree per 22 square meters. Although X Glade had more trees than Turpentine Glade, these were far more stunted resulting in a similar canopy cover of about 10%.

Flat Glade is intermediate between X Glade and Turpentine Glade in tree size and number, with an average of one tree per 26 square meters and a range of 2.4-38.0 cm dbh, with a mean of 11.32 dbh.

As in Flat Glade, many of the trees in X Glade and Turpentine Glade are old; we cored trees 28-38 cm dbh in Flat Glade and X Glade, and found that they ranged from 120 to 220 years old (MacRoberts & MacRoberts 1993; the upper figure of 380 years given in that paper is an error—the oldest tree we found was about 220 years).

Soil information on Turpentine and X glades is given in Table 1. The soil is acidic and essentially infertile and very similar to that of Flat Glade. Surface geology is resistant beds of Catahoula sandstone overlain with Kisatchie soil (fine montmorillonitic, thermic Typic Hapludalfs) (Martin *et al.* 1990:104).

The taxa found in Turpentine and X glades are listed in Table 2. Double asterisk indicates presence at Turpentine Glade only, single asterisk at X Glade only, and no symbol indicates presence at both glades.

Turpentine Glade had 69 taxa, representing 49 genera, and 25 families. X Glade had 43 taxa, representing 35 genera, and 22 families. Sorensen's Index of Similarity indicates that Turpentine and X glades are vegetationally the same community type ($IS = 74$). Most frequent species in both glades were rayless goldenrod (*Bigelovia nuttallii* Anderson) and little bluestem (*Schizachyrium scoparium* [Michx.] Nash). The families with the most species were grasses and composites, the two groups together accounting for about a third of the species.

Flat Glade is vegetationally the same community as both X Glade ($IS =$

Table 2. Taxa present at Turpentine (**) and X (*) glades, or both (no symbol).

CYPERACEAE - *Rhynchospora globularis* (Chapm.) Small, *R. plumosa* Ell.**, *Scleria ciliata* Michx.

IRIDACEAE - *Sisyrinchium sagittiferum* Bickn.**

LILIACEAE - *Aletris aurea* Walt.**, *Aletris farinosa* L.**, *Allium canadense* L.**, *Smilax glauca* Walt.

ORCHIDACEAE - *Platanthera nivea* (Nutt.) Luer**, *Spiranthes tuberosa* Raf.**, *S. vernalis* Engelm. & Gray.

PINACEAE - *Pinus echinata* P. Mill., *P. palustris* P. Mill., *P. taeda* L.

POACEAE - *Andropogon ternarius* Michx., *Aristida virgata* Trin., *Dicanthelium aciculare* (Desv. ex Poir.) Gould & Clark, *D. sphaerocarpon* (Ell.) Gould, *Muhlenbergia expansa* (Poir.) Trin.**, *Panicum virgatum* L.**, *Schizachyrium scoparium* (Michx.) Nash, *Schizachyrium tenerum* Nees**, *Sporobolus junceus* (Michx.) Kunth**.

APIACEAE - *Eryngium yuccifolium* Michx.**

ASCLEPIADACEAE - *Asclepias longifolia* Michx., *A. obovata* Ell.

ASTERACEAE - *Aster dumosus* L., *A. linariifolius* L., *A. paludosus* Dryand. ex Ait. ssp. *hemisphericus* (Alex.) Cronq., *A. sericeus* Vent. var. *microphyllus* DC.**, *Bigelovia nuttallii* Anderson, *Eupatorium rotundifolium* L.**, *Helianthus angustifolius* L., *Heterotheca graminifolia* (Michx.) Shinnery, *Hieraceum gronovii* L.**, *Liatris earlei* (E. Greene) K. Schun.**, *L. pycnostachya* Michx.,**, *L. squarrosa* (L.) Michx., *Senecio tomentosus* Michx., *Silphium laciniatum* L.**, *Solidago nitida* Torrey & Gray**, *Vernonia texana* (A. Gray) Small.**

AQUIFOLIACEAE - *Ilex opaca* Ait., *I. vomitoria* Ait.

CLUSIACEAE - *Hypericum hypericoides* (L.) Crantz.

DROSERACEAE - *Drosera brevifolia* Pursh.

ERICACEAE - *Vaccinium arboreum* Marsh, *V. corymbosum* L., *V. stamineum* L.**

EUPHORBIACEAE - *Euphorbia corollata* L.

Table 2. (continued).

FABACEAE – <i>Baptisia leucophaea</i> Nutt.**, <i>Schrankia microphylla</i> (Dry.) J.F. Macbr.**, <i>Stylosanthes biflora</i> (L.) B.S.P., <i>Tephrosia onobrychoides</i> Nutt.**, <i>T. virginiana</i> (L.) Pers.
FAGACEAE – <i>Quercus falcata</i> Michx., <i>Q. marilandica</i> Muenchh., <i>Q. stellata</i> Wang.
GENTIANACEAE – <i>Sabatia gentianoides</i> Ell.**
HAMAMELIDACEAE – <i>Liquidambar styraciflua</i> L.*
LINACEAE – <i>Linum medium</i> (Planch). Britt.
LOGANIACEAE – <i>Gelsimium sempervirens</i> (L.) St. Hill.
MYRICACEAE – <i>Myrica cerifera</i> L.
NYSSACEAE – <i>Nyssa sylvatica</i> Marsh.
POLYGALACEAE – <i>Polygala incarnata</i> L.**, <i>P. mariana</i> P. Mill.**, <i>P. nana</i> (Michx.) DC.
RUBIACEAE – <i>Hedyotis nigricans</i> (Lam.) Fosberg**.
SCROPHULARIACEAE – <i>Agalinis</i> sp., <i>Aureolaria pectinata</i> (Nutt.) Penn.*
VIOLACEAE – <i>Viola pedata</i> L.

72) and Turpentine Glade (IS = 79).

Turpentine Glade is floristically richer than X Glade, a difference due largely if not entirely to the edaphic differences between the glades. Turpentine Glade has an almost continuous herbaceous cover with stable and, in some places, fairly deep soil as evidenced by areas of erosion; whereas X Glade has little stable soil and much exposed rock.

Flat Glade is intermediate between X and Turpentine glades in degree of barrenness – it is more eroded than Turpentine Glade but less eroded than X Glade. It has much more exposed rock than Turpentine Glade, but much less than X Glade. It is intermediate in species richness, with 63 taxa.

DISCUSSION/SUMMARY

Similar glade habitat (variously described as barrens or prairie-like) occurs in east Texas. On September 18 and again on November 20 and 21, 1992, we visited some of these sites on the Angelina National Forest. While they looked very similar to our glades in surface geology and openness, vegetationally they are quite different. What data has been published (which is not exactly comparable to ours since it was not comparably collected) indicates that the Index of Similarity is only about 35 between the glades we have studied in Louisiana and those areas we examined in Texas (Marietta & Nixon 1984; Orzell 1990:228-232). The reasons for these differences are yet to be understood.

As yet we have little information on the large exposed sandstone "flat rock" or "pavement" glades that occur in the Kisatchie National Forest, but what is available indicates that they may be different enough edaphically and floristically from the communities we have been studying under the generic term "glade" to be classified as distinct communities. They appear to have not only less acidic soil (where there is soil) but to have some plants unique to them, such as *Talinum* and *Selaginella*.

During the 1993 field season we hope to study the east Texas glades/barrens/prairies and the sandstone flatrock glade communities in western Louisiana to resolve some of these problems: specifically to determine whether or not we are dealing with one community, variations of one community, or with two or more communities.

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LITERATURE CITED

- Baskin, J.M. & C.C. Baskin. 1989. Cedar glade endemics in Tennessee, and a review of their autecology. *J. Tenn. Acad. Sci.* 64:63-74.

- Bridges, E.L. & S.L. Orzell. 1989. Longleaf pine communities of the west gulf coastal plain. *Natural Areas Journal* 9:246-262.
- DeSelm, H.R. 1986. Natural forest openings on uplands in the eastern United States. Pp. 366-375. In D.L. Kulhavy & D.N. Conner, eds., *Wilderness and Natural Areas in the Eastern United States. A Management Challenge*. Stephen F. Austin State University, Nacogdoches, Texas.
- Gandhi, K.N. & R.D. Thomas. 1989. *Asteraceae of Louisiana*. Sida, Bot. Misc. No. 4. Botanical Research Institute of Texas, Fort Worth, Texas.
- MacRoberts, D.T. 1989. *A Documented Checklist and Atlas of the Vascular Flora of Louisiana*. Bull. Museum of Life Sciences, Nos. 7-9. Louisiana State University, Shreveport, Louisiana.
- MacRoberts, M.H. & B.R. MacRoberts. 1992. Floristics of a sandstone glade in western Louisiana. *Phytologia* 72:130-138.
- MacRoberts, M.H. & B.R. MacRoberts. 1993. Why don't west Louisiana bogs and glades grow up into forests? *Phytologia* 74:26-34.
- Marietta, K.L. & E.L. Nixon. 1984. Vegetation of an open, prairie-like community in eastern Texas. *Texas Journal of Science* 36:25-32.
- Martin, D.L. & L.M. Smith. 1991. A survey and description of the natural plant communities of the Kisatchie National Forest, Winn and Kisatchie Districts. Unpublished report, Louisiana Natural Heritage Program, Department of Wildlife and Fisheries, Baton Rouge, Louisiana.
- Martin, P.G., C.L. Butler, E. Scott, J.E. Lyles, M. Mariano, J. Ragus, P. Mason, & L. Schoelerman. 1990. Soil survey of Nachitoches Parish, Louisiana. United States Department of Agriculture, Soil Conservation Service.
- Orzell, S.L. 1990. Texas Natural Heritage Program Inventory of National Forests and Grasslands in Texas. Unpublished report, Texas Natural Heritage Program. Parks & Wildlife Department. Austin, Texas.
- Perkins, B.E. 1981. Vegetation of sandstone outcrops of the Cumberland Plateau. M.S. Thesis, University of Tennessee, Knoxville, Tennessee.
- Smith, L.M. 1991. Louisiana longleaf, an endangered legacy. *Louisiana Conservationist*, May/June, 24-27.